

SITE INVESTIGATIONS

INTRODUCTION

The following is a resumé of the biological investigations carried out at the sites visited by your Survey party in and about the Palmer Peninsula, Antarctica, and the South Shetland Islands. These are set forth in 18 sections I to XVIII more or less chronologically and geographically arranged under the heading "Site Investigations," as follows:

- I. January 18-20; Marguerite Bay area - Adelaide Island, Base T, Avian Island, Rothera Point.
- II. January 22-25; and March 1; Arthur Harbor area - British Base N, Bonaparte Point and vicinity, Janus Island, Torgeson Island.
- III. January 26-27, and March 1; Port Lockroy - Dorian Bay area - Base A.
- IV. January 27-31; Argentine Islands area - Lemaire Channel, Danneborg Islands, Berthelot Islets (British Base F is on Galindez).
- V. February 1-3, and March 2; Paradise Harbor area - including Chilean, Gabriel Gonzales Videla Base, and the Argentine, Almirante Brown Station.
- VI. February 4, 5; Danco-Couperille Island area.
- VII. February 6, 7; Melchior Islands area.
- VIII. February 8-10; Wilhelmina Bay - Svend Foyn Harbor - Sulvensen Cove area.
- IX. February 10, 11, 23 and 24; Brialmont Cove, Alcock Island, Spring Point.

- X. February 12, 13; Deception Island.
- XI. February 13; Yankee Harbor.
- XII. February 13; Hope Bay.
- XIII. February 15, 17-19; Seymour Island - Snow Hill Area.
- XIV. February 20, 21; Welchness, Dundee Island.
- XV. February 25; False Bay, Livingston Island.
- XVI. February 25, 26; Discovery Bay - Ash Point, Greenwich Island .
(for Yankee Harbor, this Island, see section XI February 13.)
- XVIII. March 4, 5; Admiralty Bay.
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All listings are of a very general nature. It was not possible to enumerate or identify all the seals and birds in any one area or the animals taken in the dredge or fish traps, the insects or the species of cryptogamic plant life.

The dredge material by force of circumstances, want of time and necessary equipment for handling it, was not worked over as thoroughly as I would have liked. What has been saved in the way of specimens collected by dredge, tow net, and a Nerwise must needs be identified by specialists conversant with the various groups of organisms before their geographic distribution, their relation to their environment and their associates can be discussed, and before our findings can be compared with those published by previous expeditions which worked over or collected in the same areas. A list of tow net hauls made is appended to this report.

Nevertheless, as annotated, it is believed that these listings will

convey some idea of the nature of the flora and fauna, terrestrial and aquatic, at, or in the vicinity of the sites investigated.

The comments, recommendations, and conclusions which follow are my own based on personal observation, and on discussions with other members of your Survey party.

IN CONCLUSION

Though terrestrial animal and plant life was more abundant in some areas than in others, no truly barren area was found in the sea.

Seals and their numbers are mentioned when they came to our attention. Some effort was made to note bird rookeries seen by various members of our party and by ship's personnel, and where possible, which was not as often as we would have wished, to identify the species inhabiting them.

Noteworthy bird colonies, mostly penguins, have been noted in the area sections of this report (all but sections VII, XIII, XIV, XVII, XVIII, in which poor visibility, insufficient time for searching, or lateness of season may have kept us from discovering any rookeries of consequence).

Each and every area visited in the course of this survey holds great promise for the marine biologist working on, or with particular animals or groups of them. Representatives of most, if not all phyla of marine animals, even though we may not have turned them up in our samplings, are sure to be found in the regions explored by us.

Ice conditions more than anything else will restrict, at times, the operations of those who may follow us, as such conditions hindered us on several occasions. But if we wish to know how antarctic and sub-antarctic organisms live, and where, and under what conditions, and above all know

their kinds and distribution we must not fear ice, or seek wholly to avoid it. Indeed, to get a true picture, and the whole story concerning any and all of them, we need to go where ice is though it may add to the difficulties of planned or to be planned operations. The word "hazards" might have been used along with difficulties but hazards will always be minimal if one goes with proper and adequate equipment and possessed with, or accompanied by someone with "know-how" born of experience. Do not be too fearful of "ice" in choosing the site of your station or your studies.*

* Don Squires of the U. S. National Museum who is engaged in working up the corals of "The Ross Sea Fauna" for the New Zealand Oceanographic Institute, is strongly of the same opinion. So far as it is humanly possible we should "pursue" our antarctic organisms through the winter as well as during the few summer months. The occasional open water that occurs in Arthur Harbor and perhaps more open in Paradise Harbor in the winter months could well render such a pursuit rewarding.

Personally, I favor locating the station as close to the mainland of Palmer land ~~was~~ possible and practicable (this was to be a Palmerland station, was it not?) and not in the South Shetlands. Leave the work to be done in those islands to the British who have already done so much, and published so much on that area.

I also favor sites or areas from which can be reached with greatest facility, and within reasonable distance on foot or by boat, the widest range of types of environment, and terrain, and the greatest variety and

numbers of forms of animal and plant life.

With the foregoing in mind I definitely favor placing the biological station or stations, if there is to be more than one, or a main base with one or more satellite bases, one or all, on a line running from Arthur Harbor through Port Lockroy to Paradise Harbor.

Arthur Harbor as a site for a base or major station comes first to mind as the best possible site ^{on} for most counts. It is a very favored area, weather, ice, boat shelter, water supply, and perhaps also "pied-mont" for aircraft landings, abundance, though not necessarily variety of terrestrial life (birds primarily), marine life, and ready access to a great variety of environments within not unreasonable distance. This ready access to a great variety of environments holds good for the other two sites on our projected line of stations, Port Lockroy and Paradise Harbor.

Twenty miles to the south of this "base line" is the Lemaire Channel. Here we spent the night of January 27 drifting about in this scenically breath-taking area where the mountains are as impressive and at the same time as fantastic or as beautiful in shape and form as any iceberg of imposing size and beauty so far encountered on this journey along the antarctic coast from McMurdo to Marguerite Bay and Adelaide Island to Arthur Harbor and now to this outstanding natural beauty spot.

Enhancing many fold the sheer beauty of our surroundings were the crystal clear reflections in the placid 200 fathoms deep waters of the channel those majestic mountains rising from the water's edge to snow-

topped peaks, doffing from time to time their caps of clouds thus granting the "by-stander" an opportunity to photograph them full stature.*

* "in all their imposing grandeur" I wanted to add but dared not. I beg to be forgiven for running in this "rave" but you would have been moved to feel it, ^{if} not say much the same had you been with us that lovely night of January 27, 1963.

Thirty to 35 miles to the south you come to Cape Tuxen and Green Island in the Berthelots with its "...luxuriant growth of moss nearly four acres in extent...by far the largest unbroken (sic) patch of vegetation yet found in Antarctica". On the way, having passed Pleneau and Petermann Island, with their Adelie and Gentoo rookeries, shag and tern colonies, and the Argentine Islands, where on Galindez the British Base in this area is located, you also would have seen fields of ice on which numerous seals were lying about.

Eight miles from the western end of the base-line is Cape Monaco (not seen) with its reported garland of six islets, reported as crowded with penguins in season, and 42 miles out of Bismarck Strait you come to Victor Hugo Island, and beyond that the open sea.

Some 50 miles to the north via the Neumayer Channel, an interesting stretch itself, are the Melchior Islands off the north coast of Anvers Island with its inhospitable embayments. In the Melchiors, on Lambda Island, is an unoccupied Argentine Base. Though there was not much on land to interest us the fishing was good and the dredging promising.

Northeastward by way of the Errera Channel one passes Danco Island and Couverville, and 45 miles from Port Lockroy, Cape Spigot with perhaps the second best (second largest) Chinstrap rookery (next to Alcock) in all Antarctica--and five miles beyond Cape Anna with its reported bird colonies, not seen and not identified as to inhabitants because of poor visibility.

Within 50 miles of the base line, or within a like radius from each of the recommended sites one can have everything in the way of environment, animal and plant life, that can be had in Palmerland, all that any biologist might crave for study, terrestrial or marine, in ^{or} out of the laboratory.

One hundred and 10 miles away to the northeastward also is Brialmont Cove and Alcock Island upon which is perhaps the greatest penguin colony in all Antarctica--all Chinstraps, which I hope will go unmolested for all time to come. He who has to study Chinstraps can do so on Deception Island where there are several hundred thousand, on Cape Spigot (Nunatak Negro) where even more have their home, or in the Paradise ^{Harbor} area.

Paradise Harbor I rate as desireable for a land based station next to Arthur Harbor, and Port Lockroy third. Paradise Harbor has ^{much} lots to recommend it, a good site though at present occupied by an inactive Argentine station, "Almirante Brown", proximity to rookeries of three different species of penguins (so reported) though we only came upon two of them in our few days in this area, good fishing and a promise of richer dredging returns than we had from the two samplings we had. Here perhaps more than elsewhere, it may be possible to study or at least in-

investigate the life and behavior, distribution, condition and survival of the marine inhabitants of the harbor, pelagic, ^{littoral} / and benthal as the tidal and other currents often, if not through^{out} the winter, maintain enough open water channels to permit ^{boat operations} open water. An attempt in a suitable vessel should be made to prove or disprove this contention.

Port Lockroy deserves better than a third place rating. It hurts to put so lovely a place so low, especially in view of its swell-free harbor in which a vessel might safely be wintered (shall have to ask Capt. Mac about this), and where we found the littoral faunal so very rich; but Paradise Harbor I feel quite strongly has the far greater biological potential.

Within Arthur Harbor, I favor the British Base, that area or site over Bonaparte Point, or the so-called Bravo site, for reasons stated elsewhere in this report, particularly in the discussion of the Arthur Harbor area (section II, pages 3, 4 .)

I would urge that we endeavor to get full and clear "title" to all three places by transfer, as gifts, or by some reimbursement, permitting the present builders, or owners of the huts in sites in Port Lockroy and Paradise Harbor, to remove buildings and contents should they care to do so. We should by all means start anew, and with our own, new buildings, or structures.

And now? What are we waiting for? Let's go!

POSTSCRIPTUM

Last but not least - ever since I visited McMurdo Station - I have become enamoured with the idea of a floating laboratory, or at least a sufficiently large trawlor^e type of vessel to carry on the lines of work planned of any shore-based laboratory that might be set up in Palmerland. These notes I shall organize at the first opportunity which has not yet (the time to do it) come to hand - give me just a little more time. This survey is but one of several very worthwhile projects that I have on the "fire" at this writing!

Appended to this report are a list of the tow-net hauls or tows made in the course of the survey; and an outline itinerary for ready reference. Appendixes "A" and "B".

Marguerite Bay area - Adelaide Island, Base T, Avian Island, Rothera Point.

The ice fields through which we passed getting here had quite a number of seals on ice cakes here and there. Mostly if not all Weddells I take it. Some said they saw a leopard seal but I saw none that quite fitted the description given.

Seals must be plentiful in this area; it was said that about 500 a year are killed for dog food and station mess.

At all places the "usual" birds, many still nesting here: Adelie penguins, Skuas, Blackbacked (Dominican) gulls, Blue-eyed shags, and a giant petrel; at Rothera Point also, Antarctic terns.

Mosses and lichens were collected at each place; from ~~nem~~ ^{them} mites and spring-tails were Berlesed; got about three different species of insects.

From a fresh water pool on Avian Island a few fairy-shrimp (Branchinecta) were dipped with an empty beer can lying about (Tom Berg, coll.)

Freshwater and marine algae were collected; and at Rothera Point red and green snow algae as well.

From fish trap set in five fathoms off Avian Island, no fish, a number of nemertean worms, amphipods, 2 species of starfish, 3 small sea urchins, these last at Rothera Point where the worms, and amphipods also appeared in the traps.

Dead limpet shells left by the gulls whose principal food are limpets seemed to be scattered about everywhere, some with serpulid worm shells attached.

There was much ice floating about, making tow netting difficult.

This was said to be the best year in the last six, more open water than usual. However, the ship had to shift position to avoid a sizeable iceberg; can be a nuisance here.

Avian Island despite its teeming bird life, fresh-water pools, many mosses, is not to be recommended as a station site because of the interference with the penguin rookery (and the "mess" it would have to be located in; no suitable space not occupied). *but I did not get over much of the island*

Base T site hilly; good buildings, best is the one-man "weather shack", ideal set-up of what a one-man study and laboratory could be; ^{and} sleep in.

Rothera Point, though, has the building land ^{and} (acreage and "foundation"-wise, a fine place); a low, level saddle between the "hills" toward the Point and the more mountainous piedmont to the right as viewed from the Bay landing. I wonder how wind-swept this place is; looks like a "draw". We had a fine day here, only a windy and stormy one would tell.

There were only a few penguins here compared with the hundreds at Avian Island. Lt. Thomas attempted to walk around the short of the Point but gave it up because of the determined way the skuas, which must still have been nesting, dived at him; though he saw evidence of what might have been a penguin rookery but no birds on it. Quite a few small bergs about in the landing area; seals on a number of them.

Arthur Harbor area - British Base N, Bonaparte Point and vicinity, Janus and Torgeson Islands.

There are quite a number of seals about; we had no difficulty in locating a Weddell on an ice cake for bait.

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The area is rich in bird life, especially Adelies. There is a large and populous rookery on Torgeson Island, and other sizeable colonies scattered through the area. About Cap Monaco to the west are six islets with rookeries on them, there is also a colony at Biscoe Bay on the S. W. coast of Anvers Island (tide sailing directions); others on Litonfield, Halfway and Humble Islands (tide Berg helo flight), Giant petrels, skuas, Dominican gulls, as always and in considerable numbers, Antarctic terns, and sheath-bills. Many dead limpet shells ashore, others gathered from rocks at tide level.

Mosses and lichens, grass clumps collected, and insects berlesed from this vegetation.

Fresh water algae and fairy shrimp were found in the pools atop the bluff above the Base N hut. Along shore at Bonaparte Pt. and at Base N marine algae and a few amphipods were dip-netted.

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Dredge hauls were especially productive - a varied and abundant fauna on a staff blue mud bottom, 12-17 fathoms, - a species of sponge, sea urchins, 2 sp. starfish, worms in number, the nemerteans proved to be the common species throughout the area (Amphiporus), 2-3 species of annelids (Nereis, Terebella and at least one other), 4 species of mollusks, and

several species of amphipods, an isopod, and 4 or 5 species of sea squirts (ascidians).

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The dredge haul of March 1, on our return to Arthur Harbor was a repeat of the earlier one with a host of annelid worms and mollusks.

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The fish trapping was equally rewarding, 88 nototheniid fish were taken in two sets off Janus Island together with starfish and nemertean worms. The fish ranged from 7 to $14\frac{1}{2}$ inches in length. One trap set in the rocky part of Bonaparte Inlet was crushed under a small berg that either drifted in with the tide or possibly was calved off during the night from the ice cliffs lining one side of the head of the inlet; considerable sea weed and a large clump of ascidians were dislodged as we got the jammed trap up after some hours labor; tried in forenoon, were successful with a grapnel in the afternoon.

Brash-ice troubled our March 1 landing at the Base N site, recent snows had whitened the ground and the large lake a few hundred yards behind the hut was thin-ice covered, as were the fresh water pools on the top of the bluff above the hut. A few lonesome-looking Adelies were standing on the sea-ward side of the bluff; skuas were about but in lesser numbers than in January. Where do they go; migrate as do the penguins? Torgeson Island was all but deserted, just a scattering of penguins about.

The approaches to Arthur Harbor, because of the current running through it, is said to be quite free of sea-ice more or less the year round.

Regretably during the January two hour squally we experienced in Arthur Harbor we did not get to see the Inlet; it is a remarkably protected,

quiet bit of water. On March 1st like a millpond, though it was windy and rough out in the harbor.

I do not particularly fancy the Bonaparte Point site because of its exceeding rockiness - large jagged, broken rocks, and a rather uneven gullied (or is it ridged) terrain. The Inlet, though a piece of very quiet water beautifully protected from wind and wave, might be a very dangerous place. It narrows down to about 80 feet in width, and on the right hand side are ice cliffs of about that height. These have plenty of fissures, cracks, and crevasses. A fall of a mass of ice and snow could well spell disaster to any vessel that might find itself in the Inlet at the "right" (or would it be the wrong) time. Really, how very accessible is the piedmont here?

Getting fresh water would be more of a problem than at Base N where it could be conveniently piped from the large and quite deep fresh water lake there. No dam would be needed, the valley in which it lies could hold many times the present amount of water without damming; or much of one, but the supply of water seems ample for the needs of any station that might be established ~~xxx~~ here.

Within walking distance and not near enough to be objectionable, to one side is a penguin rookery, on the other the bluff on top of which are situated the fresh water pools already referred to. A man needs to get about a bit for relaxation if for no other reason. At Bonaparte Point he could walk about on rocks and still not "be" or get anywhere.

True, the boat landing is not of the best but it could as easily be

improved as that which would have to be provided at the Bonaparte Point
side.

During the January squall the Navy Survey Party was caught out at the Base N landing. Lt. Nash said it was "not so bad" and that there was some degree of protection from what went on in the harbor outside.

I might add here, too, that Lt. Nash also favors the Base N. hut site over Bonaparte Point from an engineering point of view. I have his permission to so state.

On 21 January we were underway for Anvers Island and Arthur Harbor.

January 26-27
March 1, 1963

Port Lockroy, Dorian Bay area, Base A.

In this area the Gentoo penguins take the place of the Adelies but for this major difference bird life is as varied as elsewhere though the number of individuals seems less than at Arthur Harbor. Three chinstraps were seen among the Gentoos here by Lt. Thomas. I do not recall seeing any Giant petrels here. Rookery space is more limited, resulting in fewer colonies, but those available are well populated. Near at hand to, but not on the Base A site are sizeable Gentoo colonies, and also at Damoy Point on the way to Dorian Bay is another large one. A colony of terns holds forth on a rocky, steep-to headland near the entrance to this port, and a well populated shag colony occupies an island in Peltier Channel (Priest Id?) on the way to South Bay, Doumer Island, where the Chilean Base "Yelcho" is located. Additional colonies of Gentoos occur down this way, also. Skuas, Wilson's storm petrels and sheath-bills were about too, and in the harbor.

There was comparatively little vegetation to be seen, nothing at all to compare with the luxuriant vegetation that we were to see later in the Argentine - Berthelot Island area. From moss gathered here a few Col-
lembola were berlesed.

The more meager dredge hauls here, over a muddy bottom, in general character resemble those made at Arthur Harbor. Worm tubes were abundant; ophiurans (serpent ~~or~~ brittle stars) and ascidians of species other than those obtained at Port Arthur were washed from the mud. Additional specimens of these species were secured by the same means on occasion of our

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March 1 visit, and, unexpectedly, a tiny gasteropod.

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The richness of the shore fauna is worthy of special mention. It so happened that we landed at the Base pier at extreme low tide. In the course of a few scrapings along the rocky shore Poblete's dip-net brought up a variety of animals - the already (to us) common nemerteans (Amphiporus), three sea-anemones resembling the North temperate Metridium (the only sea-anemones at the trip it turned out), two species of amphipods, and two widely different and very characteristic Antarctic isopods, Serolis and the giant, almost 10 cm. long Glyptonotus antarcticus. And we had as favorable tide in the Arthur Harbor area, I like to think that we would have been as fortunate there. +n
X

#11-63

From the fish traps we got more nemertean worms than we knew what to do with, 2 species again of amphipods, and 7 notothoniid fishes.

The building area about Base A (Goudier Island) is a rocky one but nowhere as rough going as on Bonaparte Point, Arthur Harbor. Port Lockroy is one of the few swell-free Palmerland harbors. As to aircraft facilities, landings, see Capt. McDonald.

I cannot refrain from adding that Port Lockroy is as scenically beautiful a place as I could spend an antarctic summer in, or a winter, too, for that matter - Lemaire Channel is another.

Argentine Islands area - Lemaire Channel, Danneburg Islands, Berthelot Islets (British Base is on Galindez).

Lemaire Channel, Jan. 27-28; Pleneau Island, Jan. 28, Petermann Island, Jan. 28; Galindez Island, Jan. 29; Cape Tuxen and Green Island, northern most of the Berthelots, Jan. 31.

Galindez Base gets its fresh water from a large pond (lake?) behind the station. Many seals were basking on the ice cakes, thick in all directions, south of Galindez, more seals over a larger area than any in which we had seen any large number of them. Two whales were seen north of Galindez on the 29th.

An interesting and well populated area, animal, as well as "vegetable"-wise. Many birds breed in this area. The following list was given to me by Mr. R. Lewis of the British Base here on Galindez:

Dominican (black-backed gull) - a year-round resident, an interesting record; Great skua (breeds); Antarctic, (or is it the swallow-tailed?) tern (breeds); Giant petrel (visitor only) always seems to appear in bad weather - several to half a dozen of them - Sheath-bill (winter visitor); Wilson's storm petrel (breeds); Snow petrel (breeds locally); Adelie penguins (are on Jalour and Petermann Islands); Gentoos also on the last-named island; Chinstraps (casual visitors to the area); Emperor penguin (seen once); Blue-eyed cormorant (shag) (breeds). A cormorant colony, not seen by us, is located on Winter Island.

On Petermann Island both Gentoos and Adelies have rookeries; among the Gentoos one Adelie made ~~itself~~ itself at home. On a rocky peak across a

snow field behind the Gentoo rookery, Antarctic terns were flying about in considerable numbers, some were nesting. Jack Crowell saw one with a chick (close up - beauty of this nesting site was the fact that you could walk onto and around it to photograph the birds close-up).

At Cape Tuxen there is a colony of blue-eyed cormorants.

On our return to the ship from Green Island we tried to get photographs of a flock of 30-40 (? 20-30) of these shags sitting on the water quietly and in a surprisingly close group, but they proved wary; before we got into comfortable camera range, they dived and scattered. Green Island has a considerable population of skuas. Judging from the aggressiveness displayed by several of them, they were protecting nests and young. A large colony of cormorants is also located 4 miles south of Cape Tuxen in the Berthelot Islands.

Mosses and lichens were gathered from the several islands and the Cape, and berlesed. An amazing number of Collembola were driven out of a couple of handfuls of moss from Green Island (I brought this vial along to show you).

At Cape Tuxen and more so on Green Island, the moss growth was especially luxuriant. Most of the islands, to a greater or lesser extent, are "green as grass" on their northern, more or less snow-free, slopes.

Green Island, the northern-most of the Berthelots, lives up to its advance notices in the Admiralty's Antarctic Pilot (p. 204, 2nd edit, 1948) ".....Green islet has on its northern slopes a luxuriant growth of moss nearly 4 acres in extent with peat up to 3 feet (o m g) in thickness.

This is by far the largest unbroken patch of vegetation yet found in Antarctica." The "peat" so-called, was thick, but none that I saw or walked over was quite 3 feet thick, nor was the moss so unbroken. Where the moss grew over and down the sides of a boulder or heap of rocks, it might easily give one the impression of being a moss clump or heap three feet thick. It was thick all right, much of it was dead or looked so underneath. There were breaks and gaps in the patch as a whole, but there were no extensive gaps or large areas on the slope bare of moss - quite a sight!

#14-63

Two dredge hauls made at our Galindez Island anchorage, in 25 to 42 fathoms, and results combined into one. They brought up a portion of a silicious sponge, a number of worms, starfish ophiurans, a red sea-urchin and the first crinoid of the cruise, a gastropod mollusk, and a number of long stalked ascidians. A second specimen of the same species of *ophrorhynchus* orinoid was found in mud attached to the anchor when it was raised on 31 January.

The fish traps disappointed us, no fish, nemertean worms, a few, and a starfish - the cove by the Base landing was evidently a poor location for catching fish. Had there been time a second set in another location might have brought us better luck. We had drawn a blank as regards fish in Arthur Harbor the first time around. It was the second at Arthur Harbor that turned up the best catch of the cruise.

This area with its many islands and its nearby "deeps" and channels (Lemaire) is undoubtedly ~~by~~ biologically a very rich one. For a possible satellite station in this area a side with a good boat shelter should be

selected, Winter Island - Stella Creek where the Penola wintered, Petermann Island where Charcot holed up in 19¹²~~82~~, or possibly Cape Tuxen at which another look might be had for faunal and floral growths - it is hard by Green Island. But then again, I do think we should leave the area largely or wholly to the British; they were here first, have done a lot, and will undoubtedly do more as time goes on. Not long before our arrival the folks at the Base had sent off quite a lot of "pickled" invertebrates to the British Museum. Here should be recorded also, that to help me out with my shortage of bottles they gave me a case of "handsome" wide-mouth gallon jars - a "God-send", if ever a biologist had one!

January 27-31, 1963

IV

Argentine Islands area - Lemaire Channel, Danneburg Islands, Berthelot Islets (British Base is on Galindez)

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The "peat," so-called, was thick, but none that I saw or walked over was quite three feet thick, nor was the moss so unbroken. Where the moss grew over and down the sides of a boulder or heap of rocks, it might easily give one the impression of being a moss clump or heap three feet thick. It was thick, all right, much of it was dead or looked so underneath. There were breaks and gaps in the patch as a whole, but there were no extensive gaps or large areas on the slope bare of moss - quite a sight!

#14-63

Two dredge hauls made at our Galindez Island anchorage, in 25 ¹/₂ to 42 fathoms, and results combined into one. They brought up a portion of a silicious sponge, a number of worms, starfish ophiurans, a red sea-urchin and the first crinoid of the cruise, a gastropod mollusk, and a number of long-stalked ascidians. A second specimen of the same species of crinoid was found in mud attached to the anchor when it was raised on 31 January.

The fish traps disappointed us, no fish, unvertebrate worms, a few, and a starfish,--the cove by the Base landing was evidently a poor location for catching fish. Had there been time a second set in another location might have brought us better luck. We had drawn a blank as regards fish in Arthur Harbor the first time around. It was the second at Arthur Harbor that turned up the best catch of the cruise.

This area with its many islands and its nearby "deeps" and channels (Lemaire) is undoubtedly a very rich one biologically. For a possible satellite station in this area a site with a good boat shelter should be selected, Winter Island - Stella Creek where the Penola wintered, Petermann Island where Charcot holed up in 1902, or possibly Cape Tuxen at which another look might be had for faunal and floral growths - it is

hard-by Green Island. But then again, I do think we should leave the area largely or wholly to the British; they were here first, have done a lot, and will undoubtedly do more as time goes on. Not long before our arrival, the folks at the Base had sent off quite a lot of "pickled" invertebrates to the British Museum. Here should be recorded also, that to help me out with my shortage of bottles they gave me a case of "handsome" wide-mouth gallon jars - a "God-send," if ever a biologist had one!

February 1-3,
March 2, 1963

Paradise Harbor area - including the Chilean Gabriel Gonzales Videla Base and the Argentine Almirante Brown Station.

This area is said to have breeding colonies of three species of penguins, I have no reason to doubt this but I saw only two, Gentoo and Chinstrap, in goodly numbers and in several places. Members of the Chilean Base said the Addies are not far away at "Paterna" which was written out for me. This locality, if it is one, I have not been able to locate. I expect by correspondence later to run it down. There are extensive shag (blue-eyed cormorant) colonies in this area or near-by on Cape Duthiers, "just around the corner" on the way to Anvord Bay. Cape Pigeons, and about all the birds seen elsewhere.

The Chilean station is built upon an island thickly populated by Gentoo and Chinstrap penguins, right in among them seeing what's here, what it has done to the birds, in part at least, and the filth that surrounds the buildings as a result, I would recommend against locating any station on a bird rookery; it is neither fair to man or beast.

On a point across the harbor on Lemaire Island is a penguin rookery (birds not identified - did not get close enough, and on Bryde Island or a rocky ledge or islet hard by is also a good-sized penguin rookery, around the shores of which a number of seals that I take to be crab-eaters, had hauled out.

Mosses collected yielded Collembola in modest quantity.

#17-63
#24-63

Two dredge hauls made on rocky bottom, 33+41 fms. returned a variety of invertebrates, perhaps the greatest variety seen so far: Sponges, hydroids, and another type of coelenterate polyp that I cannot at the moment readily place, bryozoans (moss animals), ophiurans holothurians, clams, 2 caprellid amphipods - elusive creatures - the only two recovered from any of our dredgings, and ascidians again. Palmerland waters, if not the rest of Antarctic, is certainly sea-squirt heaven. I have collected many over the years but never so many different kinds, so structurally different (external appearance) on any previous cruise.

#20-63
#25-63

Of two sets of the fish traps, the first off the Chilean Base we got nothing but a "mess", a 100 or more nemertean worms and several different species of amphipods. A large jelly fish and a ^ctenophore, "comb-jelly" were picked-up drifting by in the tidal current.

With the dip net a lot of algae and amphipods, a large red species (Paradexmine?) were captured. These could well furnish ample meals for many penguins. I get the idea from the penguin behavior here. As we were working along this stretch of shore several penguins were seen actively diving, duck fashion, heads down, tail up, and when their heads came up above water again, working their bills as though they were eating something that either tasted good, or was satisfying. After a number of such dips, these birds, 3 or 4 of them, headed out to sea. I did want to have a look into those particular penguin stomachs to verify my suspicion that this omnipresent and abundant food material formed an important part of the penguin dietary. If the amphipods are as abundant elsewhere as in the red seaweeds here, they must play a far more important role in the

economy of penguin life than heretofore realized (or has this side of the penguin dietary already been studied by someone else?).

As far as our tow-netting efforts are concerned "krill", the Euphausian "shrimp", have been elusive animals, but as luck would have it a goodly number were thrown up on the forecastle deck in the small hours of the morning on our way to Paradise Harbor; one was still alive and swimming about in the depression under a flush hatch-handle. From the anchor the same morning, a small, white holothurian.

I am much taken with Paradise Harbor and the opportunities that it may have for biological research. I feel sure that biologically at least it will justify its name.

The harbor has its ice conditions but I read in the coast pilot or sailing directions, that though there is considerable movement of ice through the passage between Lemaire and Bryde Islands, the upwards of 3 knot tidal currents prevent ice in the bay from freezing ~~even~~ ^{solid} in the winter months (could be). Bergs there are, and more will be calved but do not let us forego the studies that should be made of animals under natural conditions just because of some floating ice. We should have the whole year round picture so far as possible, not just a series of summer sketches.

Moreover, Paradise Harbor indents the mainland, not one of its many off-lying islands.

There is an excellent station site, that of the Argentine Almirante Brown Base, with not unworthy boat shelter nearby. Hope we can get title to the place and erect entirely new buildings. Again the high cliff face,

I should like to see a multi-story building, 2 or 3, if not more stories, with a cantilever platform "out front" to which the station boat could be hoisted, as well as supplies that could be stored right in the first story of the building.

Such a building ~~as with no cliff~~ to which I would attach or anchor it would be as snow-free as the cliff All problems ^whaste and water would be solved (snow and ice for melting are atop the cliff or close by), plenty of ice and bergy bits ^{float} ~~flow~~ by. The several storied building would make for ~~the~~ conservation ^{roof} ~~of~~ much of the warmth (heat) ^{is} ~~lost~~ through the roof of a one-story building. Then again, ^{The fact that the cliff} ~~the~~ side of the building ^{is} ~~not being~~ exposed to the winds would also minimize heat loss.

Danco - Couverville Island area.

Here is an outstanding bird area - Gentoo and Chinstrap penguins in large rookeries. The former are centered on Couverville and thus negate this excellent building site as a place for a laboratory. There also happens to be a fine safe boat shelter on the east side of this island behind a natural breakwater upon which a small shelter could be erected. At high tide it would be isolated as water flows in over the in-shore end of this ridge. Atop its widest part is an abandoned whale boat. The whalers knew a good shelter when they saw one. There is quite a bit of snow-free rock here. Jack Crowell has walked over it.

A short distance to the north of the Base "O" hut, on Danco Island, there is a large Gentoo colony, where birds were marching back and forth in deep "ruts" or tracks all the while we were ashore. The landing is poor here because along the shore the water is so very shallow for quite a distance out.

Last but not least is the Chinstrap penguin rookery, or rather metropolis, on Cape Spigot. It is a sight worth travelling to Antarctica to see. On the Argentine charts the name is Nunatak Negro. Its fore shore is crowded with Chinstraps, among whom a single Gentoo was spotted, but the bulk of the Chinstraps in this vast rookery had nests, or roosts if you will, all over the rock, steep slopes of Cape Spigot. Every snow-free patch of rock, and the greater part of this great and impressive Cape was crowded with penguins. Capt. McDonald estimated that this nunatak must have at least ~~1~~ 300,000 Chinstraps. What hikers and climbers

*For the purpose of the expedition
young shells and bones
- 16 -*

the Chinstraps must be to avail themselves of this high and steep-sided peak to colonize its uttermost heights 938 feet above the sea! Most of the the road upwards for those that had not settled on the foreshore was over a small steep-to snow field lying shoreward of the bare crest of the "saddle" between the peak of the Cape and the ice sheet or cap further to the north of it.

#27-63
#28-63

Two dredge hauls were made on February 5, the first at the Base O, Danco Island, in 41 fms; the second at the anchorage in Errera Channel nearer Couverville in 46 fms. At both the bottom was more or less rocky and very much alike in their sampling of the channel bottom animal life: Echinoderms predominated, many ophiurans, a few starfish, and a dozen or more red sea-urchins. In the second haul were several forms of animal life not found in the first, a large nereid worm, a number of bryozoan fragments, and what made me want to let out a cheer a hippolytid shrimp, the first and, as it proved to be later, the only decapod crustacean taken on this cruise. Two white starfish came up on the anchor at the first of our anchorages of this day. A small silver-sided fish, also unique in our collections, 6 inches long, apparently dropped by some bird, ^{by Lt. Nash} was picked up on Couverville while ^{we were} ~~he was~~ ashore surveying a possible site. No really suitable site for a station of any size seems available either here or at Cape Spigot unless one wants to bed-down with the penguins. The possibility of finding space enough for some small shelter on the natural breakwater on the east side of Couverville was mentioned above. The only need would be for penguin studies, the marine fauna would be a job for a vessel hereabouts, and Chinstraps might be more conveniently

studied in Paradise Harbor if an when one might acquire the Argentine Base there; and as we learned later, at Deception Islands.

Ink notes added 8.VI.66

VII

February 6, 7, 1963

Melchior Islands area, principally with reference to the Argentine Station located here on Lambda Island.

There was a great deal of snow about and between some of the buildings - most of the other islands round-about and this one off the station area are heavily ice-capped. Not much chance to set up "business" here or the urge to do so after seeing this site.

see note bottom of page, but I do have note that several things were picked up

No shore collecting ^{as such} done, no real opportunity for it while here, few birds about, some Dominican gulls, Wilson's storm petrels, and a giant petrel (brown phase).

#32-63

Our dredge, hauled over a mud and sand bottom at 25 fms., brought us the first sponge of any appreciable size so far, a compact, siliceous one about 8 or 9 inches in diameter; also worms; a starfish; a number of sea-urchins; an alcyonarian; a bright yellow sea-slug; half-a-dozen sea-squirts; and a number of tiny red amphipods that either lived on that siliceous sponge's rough surface or in its canals.

#34-63

#33-63

From the fish traps, after an overnight soak in 7-11 fms., 22 fish ranging from 11 to 14½ inches were found, together with two starfish, and a "crop" of the omnipresent amphipods. Four other fish were taken over the ship's side on hand lines. On the anchor, as it was hoisted, were two bright yellow prickly (soft-spined) ascidians like the bright yellow sea slug in color, also the first of their kind seen on this trip. Is there any reason for this identical color in two widely different forms of animal life - from the same general area, and at that not so far apart?

this is sh. 33

Lambda was the only island visited during the short time spent in

this area. From a marine biological point of view the biological potential

at bottom of note book page I have "couple" ^{on which notes for 32-63 were entered} ~~couple~~ ^{interesting} entry.
" #32 a amphipods and small stuff from shore."
This must have been shore of Lambda Id.

is high and holds promise of even more interesting things to come than bright lemon yellow invertebrates representing two widely different phyla.

On the way from Melchior to Fort Lockroy the ship headed southeastward down the Schollaert Channel. On the way, she entered each of the great bays indenting the northern coast of Anvers Island; first Lapeyriere lying between the Hump and the Gourdon Peninsula; next Patagonia Bay between the Gourdon and Thompson peninsulas; and lastly, Fournier Bay and Inverleith Harbor which indents its eastern shore.

Some seals, not many in any case, were basking on ice cakes or small bergs in each of these bodies of water; a killer whale (Orca) was seen in Patagonia Bay - little else, only a few stray birds, other than the omnipresent Wilson's storm petrel, a Dominican gull or two, a skua now and then, a tern, a giant petrel, and a snow petrel or sheath-bill. Saw more seals than birds. A foggy overcast, somewhat dismal day; ice cliffs round about.

Spotted no "sites" likely or unlikely.

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From the fish traps, after an overnight soak in 7-11 fms., 22 fish ranging from 11 to $14\frac{1}{2}$ inches were found, together with 2 starfish, and a "crop" of the omnipresent amphipods. Four other fish were taken over the ship's side on hand lines. On the anchor, as it was hoisted, were two bright yellow, prickly (soft-spined) ascidians like the bright yellow sea slug in color, also the first of their kind seen on this trip. Is there any reason for this identical color in two widely different forms of animal life - from the same general area, and at that not so far apart?

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Wilhelmina Bay - Svend Foyn Harbor - Salvensen Cove area.

In the afternoon of the eighth, the ship moved into Wilhelmina Bay past Cape Anna. The Cape is reported to be the nesting site of countless cormorants and gulls but distance and not the best visibility precluded identification of the birds whose rookeries we glimpsed.

Capt. McDonald who flew a helicopter reconnaissance of Wilhelmina Bay while the ship was lying-to reported: Ice cliffs on all sides, no building sites or boat shelters, 2 active glaciers, some fast ice.

The night of February 8 the ship anchored in Svend Foyn Harbor at 1940. We then took out our fish traps and made a tow-net haul. The dredge came up empty this evening, so the haul was not counted and no other attempted because of the lateness of the hour.

Shore collecting also proved impractical this evening and the next day when a successful dredge haul was completed and the fish traps lifted.

#37-63

Dragged from 18 to 25 fathoms over sand and gravel bottom. The dredge bucket brought in a foot-long nemertean worm; several annelids; some small white starfish; a considerable number of red sea-urchins of the species we have taken on a number of occasions; a rather largeophiuran differing, so far as I could make out, from all previously caught; a number of bryozoan fragments; the first brachiopods of the cruise, quite tiny fellows though; 2 species of mollusks; a few amphipods (as usual); and about a dozen sea squirts.

#36-63

Thirteen notothoniid fish were trapped. Of these the largest measured 15 inches in length, ~~xxxx~~ the smallest, of apparently another species,

5 $\frac{1}{4}$. A 10-inch notothoniid was caught over the ship's side on a hand line.

February 9, Cmdr. Lewis gave me a photo-copy of this area, on which he had noted the penguin colonies he had seen in the course of two days of helicopter reconnaissance flying; he also noted any conspicuous lichen stands that caught his eye -- encrusting yellow lichens primarily. The flights ranged from Hansen Island northward as far as Challenger Island just above Bluff Island. His observations as entered on the charts herewith, follow. He considered as "small" colonies estimated to contain under a 1000 birds, and as "medium" if the individuals present were estimated to number from 1000 to 5000.

(1) North end of Delaite Island, small penguin colony.

(2) Two rocks or islets, south of the largest of the Racovitza Islands have each small penguin colonies on them.

(3) (On the way into the cove in Svend Foyn Harbor in which the wreck lies, a rocky point to the left has a shag colony on it -- half the birds were sitting, perhaps better standing, in the sheet of snow above the bare rock area on which the rest of the birds stood.) (This is my personal observation entered on the Commodore's charts.)

(4) Penguins on rocks and islets ringing Icarus Point.

(5) and at the western end of Bancroft Bay numerous shag colonies.

(6) Left "arm" of Reclus Peninsula on a 500-foot high cliff (west of the 1270 elevation on the chart) a medium-sized penguin colony.

(7) Southernmost of the Gaston Islands medium-sized penguin colony.

(8) Shags and sparse lichen growth on Andree Island in Recess Cove.

(9) On Peninsula extending out from shore before Santos Peak a small penguin colony either side.

(10) Northern extremity of Bluff Island small penguin colony, and lichens.

The Commodore also indicated that there were many seals on, or about the rocks (and/or ice) and islets north of the Reclus Peninsula, and about the little hooked peninsula, Portal Point, extending eastward, and more seals a little farther south along the coast.

Svend Foyn Harbor was much favored by whalers in by-gone days. It is said to be a place of generally favorable weather (H.O. Sailing Directions, p. 194), even though there are at times violent south-easterly winds. After having seen all three places in this area, Capt. McDonald believes that ice conditions are probably better here than at Alcock Island farther up the coast, or at Welchness, Dundee Island, over on the east side of the Palmer Peninsula.

The Captain also remarked that there is a small boat shelter available here near the islet on which rest several of the old, "man-powered," whale boats or what is left of them. On this small rocky islet is space that could be utilized for a small building (sub-station or shelter).

The bottom of the harbor is rocky, and poor holding ground, a fact appreciated by those whalers for they installed moorings here and there on rocky ledges as elsewhere in places favored by them along the Palmer coast and islands.

The Staten Island moved out of Svend Foyn at 1500 and cruised the Brabant coast the afternoon of the 9th. No site areas noted. Passed

Auguste Island and Cabalescou Islet. The former is mostly snow-free, the latter, also largely snow-free, has penguins and cormorants "aboard" (tide sailing directions) but we were too far off to see what was what. The former small island is beset with shoals and apparently offers no shelter for small craft.

For the night we lay over in Hughes Bay and the ship's force spent the following forenoon overhauling the helicopters, effecting repairs to one of the two steam boilers, and shifting the LCVP #1's motor into the Greenland cruiser.

As the ship passed through Salvensen Cove one of the deck officers noticed several patches of "red water" but did not mention the matter until some time later, too late to do anything about it. It assuredly must have been krill which has been eluding our nets and drags except for an occasional specimen. How I would like to have made a tow through that "red water."

On the starboard side going into Salvensen Bay there is quite a large cormorant colony with half the birds sitting up on the snow field above the rock exposures that marked the nesting sites. It was like the state of affairs we had earlier observed on some exposed rocks at the head of a cove harboring a wreck in Svend Foyn Harbor.

Dredge haul and fish trap evidence backed up by "red water" seem to indicate that the Svend Foyn area might profitably be exploited biologically.

By 1100 the ship was underway again, headed for Brialmont Cove.

February 10, 11,
23 and 24, 1963

Brialmont Cove, Alcock Island, Spring Point.

Several hours were spent locating a suitable and satisfactory anchorage; a considerable part of the cove is around 200 fms. deep.

This is quite a lively place, seals scattered about. It has been some time since we have seen quite so many around any of our anchorages. They were mostly, or all, crabeaters. Capt. McDonald said that he saw one leopard seal in the bay, and a number about Alcock Island on which there is a large penguin colony.

We killed one of the crab-eaters for bait for our fish traps. (Doty shot him, the very first shot must have severed the spinal cord, for the seal quivered and died.) Doty's second shot was not needed but was fired as a precaution before the boat crew climbed over onto the ice cake where the seal was resting so that we could get this "ton", it seemed, of seal meat aboard. In its stomach were several gallons of krill. The krill in the two ends of the stomach were distinctly different in color, and I believe due to a difference in species rather than degree of digestion. Shall check when specimens get home.

Contemplating that seal's relatively small mouth and insignificant teeth, and then the gallons of shrimp in its stomach, one is forced to conclude that the krill were so numerous and so crowded together that the mass of them must have had the consistency of thick porridge. How else could that seal have picked up perhaps three gallons of small shrimp in his small mouth?

Again, the usual run of birds, more numerous than usual: Storm

petrels, Wilson's; Cape Pigeons; Dominican gulls; Sheath-bills (shags); Skuas; a Giant Petrel; and penguins, and penguins! The latter appear to have taken over about all available rocks and islets about the Cove and virtually the whole of the snow-free parts of Alcock Island. These penguins are Chinstraps, the little fellows with the urge to climb high in this world of ours. Alcock's difficult and precipitous terrain reminds one of Cape Spigot in the Danco - Couverville Island area, but nowhere nearly so high, only a bit more than 300 feet, as compared with Spigot's 938. But Alcock must be much more densely populated. Capt. McDonald, who has reconnoitered Alcock from the air and has landed on its shores thinks it has more penguins on it than Cape Hallett, with its 300,000, down McMurdo way. He said he believes it to be about the largest penguin rookery that he has ever seen in all his eight years of Antarctic ~~xxxxxx~~ experience.

At the foot of Alcock's precipitous slopes, the Captain found a small cove that would afford shelter for a small boat. Adjacent was a piece of penguin-free land upon which one might build without interfering with the Chinstrap way of life, which includes an "awful" lot of steep uphill climbing for they occupy most every bit of snow-free rock on Alcock as at Spigot, to its very top. However, I would like to see the Alcock Chinstraps, as well as those at Cape Spigot, left undisturbed. Anyone having the urge to study Chinstraps can do so in Paradise Harbor, living as did A. C. Bogdanovich at the Chilean Station there in 1959-1960 as an observer, or even more conveniently at Deception Island where live several hundred thousand Chinstraps, and where comfortable accommodations may be found at any one of three stations, Argentine, British or Chilean.

Mosses and lichens were collected ashore on each of our visits to the Cove, February 10-11, and 23-24, at Alcock Island and at Spring Point. In spray-fed pools, or rather pockets of water among the rocks on a rocky islet that is virtually a part of Alcock, we dip-netted with a fine meshed net the young stages of some amphipod, along with the algae that were growing in the same little bodies of water.

#40-63
#58-63

Two dredge hauls were made here. The first on February 11, in 35 fms. off the ship where the bottom may best be described as a "regular concrete mix", sand, gravel and good-sized stones. Some of the stones and larger pieces of gravel carried encrusting bryozoans. There were also a few small worms, amphipods and bits of algae in the dredge. That our dredge did not bring up more bottom dwelling organisms may have been due to the inadequacy of our equipment for this type of bottom or that the place in which dredge was dropped was rather barren. Only another drag might tell. That opportunity was vouchsafed us on the 24th of February. This time there was mud mixed in with the gravel in a depth of 18 fathoms. The dredge when brought up was quite alive with a variety of invertebrates: 3 or more species of worms; disintegrated bits of some jelly-fish like organism; hydroids; an alcyonarian or antipatharian; both branching and latticed bryozoans; starfish; 1 tiny opiuran; and several crinoids, the first time that we have taken them in numbers.

What might we have not gotten in other parts of the cove if there had been time and the facility for carrying our oil-drum dredge about in it.

We almost lost one of our fish traps here beneath a small iceberg.

We were a long time getting it out from under, and when we did get it up, it was practically empty. From the two traps set we got only a few amphipods and bits of algae.

Despite the rather poor showing of dredge and trap, I still think that we have an area that will prove rich if ever intensive work is carried on in it.

With a suitable vessel and the right gear, one would not need a shore-based laboratory to properly work over this area. I would recommend the acquisition of such a vessel.

Deception Island.

This place has most everything, plenty of "flat" land for building sites and air strips, and plenty of running melt-water - even a "built-in" source of heat, and power perhaps. Thermal wells produce heat and power in New Zealand's North Island and in Italy. Why not here where clouds of steam arise at low tide in the beach sands down in front of the old whale factor?

For him who wishes to study Chinstraps, this should be the place. Some 250,000 Chinstraps live on the outer slopes of this old volcano. Excellent accommodations could probably be arranged for at any one of the three bases or stations maintained here by as many different nations, Argentina, Chile and the United Kingdom.

A number of other birds are to be found nesting here as well. Cape Pigeons are around most of the year except between August 11 and September 8. Common also is the Cominacan gull, which in contrast to its fellows in the Argentine Islands much farther south, is a non-resident at Deception Island. At Deception, we find also Sheath-bills (or Snow petrels), Wilson's storm petrels, the Giant petrel, swallow-tailed (or Antarctic terns), and Blue-eyed shags. Gentoo penguins are occasional; sometimes "touring parties" of 10 or a dozen arrive, at times accompanied by single Adelies. At times Macaroni penguins are seen; three pairs have been seen nesting among the Chinstraps. Bird-wise this is an altogether interesting place.

In the course of a brief period ashore three or four Sheath-bills were noticed picking over a pile of rocks on shore, and behaving along the

water's edge like so many waders. Scrapings from the rocks were made. All that we noticed were some tiny mollusks (³asteropods), and a coating of green algae. Mosses, lichens, and fresh-water algae from a melt-water stream were also gathered in; the mosses Berlesed for insects.

Time was not vouchsafed us for a dredge haul. It is true that with the trash and "junk" on the bottom left from the whaling days, we might have lost our dredge, but made aboard here by the engineer's force out of an old steel oil drum, replacement would not have been difficult, and there was cable to spare on the hydrographic winch, the outer turns of which had been pretty well used already.

Fishing with the traps revealed that fishes were plentiful. Thirty-five were taken in the overnight set in 5 and 8 fms. They range in length from 11 to 21 inches; the larger fish were in the trap set in 8 fms.

Near the shore before the old wrecked whale factory and ⁵dry-works are a number of large steel tanks, rusty to be sure. A couple of them have had openins ³cut into them at ground level and are used as store houses. Should ever a "station" or laboratory be planned for Deception, it would be an easy matter to convert one or more of the remaining tanks into laboratories and quarters. Cork insulation as we have it aboard the Staten Island, ports and doors cut in, two decks installed would give one a very substantial, comfortable, already roofed building with a possible source of heat hard by the door, and water or its makings also close at hand.

There is a well, back from the beach, in which the water has a temperature of 65°F, but this is not for drinking, melt-water streams are

everywhere, and snow and ice readily accessible.

Except for the fact that the island is already over-crowded, it could be made into a very wonderful center for biological studies. The possibility that the old volcano might again act up would always be with us, but is it not a dying one, though slowly, if you look back over its history?

Yankee Harbor.

Here there is a great deal of more or less level land upon which one could build. However, the long spit of rock, rounded boulders, stones, and gravel (shingle), strikes me as an area that can be terribly wet, wind and wave swept at times. The stones forming the ocean front rampart seem to have been piled up, ^{and} rolled about as so many grains of sand in a sand dune. On land there is no protection against storms, though the spit offers ^{some} protection for boats within the harbor.

Within the harbor we found the foreshore almost wholly blocked by drift ice, carried ~~h~~ there, and held by tidal or other currents. Though a fairly strong wind was blowing across the spit from the ocean side it had no ^{or} effect on the ice sheltered from that wind by the spit low as it was. I get the impression that that ice is always ^{here} and constantly kept replenished by slides from the ice cliffs that ring the other half of the harbor.

The better building site, or sites, other things being discounted so far as terrain goes, are on the penguin rookery at the head of the harbor. For this reason, I recommend against this place for a permanent station.

Mosses, a few lichens, and samples of the algae on the beaches were collected. From moss scraped off a rock high on the spit we Berlesed more mites than I had seen so far on this trip. There were some Collembola too in the mosses collected ashore.

first brought up a small starfish; a half dozen crinoids, the greatest number of these echinoderms taken in any one place, before this we had but one or two in very few of our previous hauls; there were also a few worm tubes; several small ascidians; and algal fragments; all were washed clean of bottom material, no mud, no sand, no gravel, no rocks. In the second haul we got a lot of stiff mud from which sponges; many tube worms; ophiurans, ascidians; and algae were obtained.

Our stay was too brief for a trial with the fish trap. These should have not less than an all-night soak; besides, 48 or 36 hours are always better than 24.

One is intrigued with the number of crinoids. More drags could be profitably made, but from a trawler, rather than working out of a shore base with a small boat.

I do not favor Yankee Harbor as a laboratory site for reasons stated above -- penguins, wind, weather and ice.

Hope Bay.

This is an icy, extremely windy place as Capt. McDonald can tell you.

There are two bases already here, British and Argentine. The latter occupies the most favorable part of the area and has the best installation, as well as landing, or dock facilities. Landing from boats at the British Base is difficult except at high tide; a pier once there is no more.

The Argentine Base sits upon what must have been a part of the large Adelie colony nearby. Prospects are that it will, in time, become further depleted as the young pups and sledge dogs (to be) still untrained, run free. While we passed through three young dogs ran down, worried and killed a full grown penguin. How often this happens is anybody's guess. The Argentine who was showing us about, went through the motions of pulling the dogs off, slapped at them, which gave us the license to administer a kick or two, all to no avail. The dogs would turn away, but ran after the penguin again as soon as our backs were turned. One got in a good bite - there was no use sticking around longer.

With untethered young dogs about one can easily clear off a penguin rookery for a building site. I do not recommend this, nor write this for publication - this paragraph and the one preceding it!

At the Argentine Base the wardroom mess was hospitably entertained at "Asado", a real "criollo" affair.

At the British Base we had earlier had tea. Here we learned that occasionally Chinstraps, and a few Gentoos, turn up; that Sheath-bills are resident, skuas and Dominican gulls, well known; Snow petrels are

occasional, as are also Fulmers and Giant petrels; shags occur in limited numbers, and Antarctic terns (or are they the Swallow-tailed ones) can be found about the "lakes". Young's Point has Silver-grey petrels, and Adelies have a rookery on Vorter (sic) Island further south; still farther on one encounters Emperors.

High tide curtailed our dip-netting along shore. Moss was about in very small patches, widely scattered; did not see any worthwhile "stands." What we gathered and Berlesed yielded very few insects.

The dredge haul at the ship's anchorage, in 25-30 fms., mud and sand bottom, turned up many tube worms, some small claims, a gasteropod, ophiurans and algae.

Twenty-two fish were trapped, a goodly catch - where there are fish in plenty there must be an abundance of food for ~~men~~^{them}. Stomach contents of those picked out for preservation, I expect to have examined in Washington. Having no facilities for curing for a lot of pickled fish, the fish I have saved have been frozen. Let us hope that ~~we~~ we can get them all back in the same state.

I cannot recommend Hope Bay as a possible or future station site. I am sure it is located in a biologically rich and interesting area, but as already said, it has been taken over by others. On the score of wind and weather, too, I cannot rate it high in any list of station sites.

Seymour Island - Snow Hill area.

Seymour Island has about as large or perhaps larger snow-free area as any place we have seen to date. It is a soft and muddy place; one could almost call the soil, loam, so soft is it, but nothing much grows on it. Saw and gathered very little plant material ashore.

"Amid-ships" toward the south is a great "alluvial" river valley with running water and tributary streams, some, though, at this time of year were much reduced in volume.

Few birds, fewer seals, about. One dead one, very old carcass, only skin and bones left, was found in a gully toward the south end of the island.

The island is a barren looking place so far as animal and plant life was concerned when we were there.

Paleontologically, the island has quite a different "face." Much has been done here in this line. I do not know how much more remains to be done. This would bear looking into. Mr. Berg, and the Commodore in a brief space of time secured a number of highly interesting fossils, wood, bone, and shell specimens.

Most zoologists are interested in paleontological doings, for them it is but fossil zoology.

As to recent organisms: From the ship lying to in the ice off Seymour Island a few hours on February 15, two hauls were made in 38 fms. over a rock, sand, and gravel bottom; because they were made at the same place and were so similar, the results were treated as one. Thin, thread-

like worm tubes were in this drag by the thousands, along with some clam, and nemertean worms; included in the haul was our first living barnacle; some alcyonarians; and several stalked, white ascidians that had much the look of "Jack-in-the-pulpits."

Another dredge haul was made while ^{at} anchor off Snow Hill Island on 17 February, in 14-15 fms., on a bottom of mud so tough and stiff that it was like handling silicon putty, or a tough synthetic rubber mass. In this haul we found a strange polyp, the type of coelenterate represented I do not know; there were also a nemertean worm, 3 species of annelids; several sea-urchins in part fragmented; some bivalve mollusks; and the first ^{two} cumaceans ^{cu} so far seen (Cumaceans are small, often tiny shrimp-like crustaceans, bottom feeders).

Two other dredge hauls combined, were made in 12 fms. over a tenacious mud-cemented sand bottom on the 19th. This time we got more worms; a starfish; hydroids; a piece of an alcyonairian; one tiny amphipod; and a number of small living clams, and some dead shells.

Perhaps the most interesting of all specimens that were secured in this area were three large, red sea-spiders, ⁷pychogonids. These had 2/ 7 hopped onto a fish trap let down over the side of the anchored ship on the night of the 18th, supposedly a fathom or two off the bottom so that the trap would not drag as the ship swung with wind and/or tide. The trap hauled up ⁷ the morning of the 19th held nothing else of consequence, a fragment of a yellow sponge, and scraps of algae.

Tried this "stunt" the night of the 19th but lost the trap as some ice cake or berg coming alongside during the night carried it off.

There seems to be quite a bit of drift ice in desultory movement in this area, probably more wind and current driven than otherwise; but its behavior could not be foretold or counted on.

We really have a rich and promising bottom in this area, in and about Seymout⁷, Snow Hill, and nearby Vega, Cockburn, and other islands. In almost every dredge haul made along the Palmer Peninsula we got some form of animal life that we had not turned up in any of the hauls preceding the one in hand.

It does seem to me that a thorough-going marine biological survey be made of the territory - the sea and bay bottoms sailed over in this cruise, in the area where the Eltanin cannot or should not operate.

And for this a vessel or vessels should be provided with all necessary "gear" and equipment, enabling it to work in depths upwards of 400 and 500 fathoms, and with auxilliary small crafts/^{aboard}for inshore, shallow water work.

Welchness, Dundee Island.

Here we have acres of snow-free land, enough or almost enough to set up a second McMurdo, but the place apparently has been taken over by the Argentines, judging from buildings, survey stakes, and tractor tracks.

Landing with or from the LCVP was troublesome, beached ice-cakes lined the shores of the peninsula or spit that forms the major part of Cape Welchness ^{ice} seaward as well as windward sides.

Ashore we covered the open, more or less level, snow-free land from one side of the peninsula to the other. Found only ^{scanty} sandy and scattered small patches of moss. Apparently few birds about, other than a small flock or group of terns where the peninsula met the ice cliffs on the windward side, none of the birds seen were nesting; Gentoo penguins were few and far between; a Dominican gull or two was flying about, more were "roosting" on an ice cake just off shore. Standing on a small hillock was a Skua and her nearly mature chick, but no others in the air at the time. The garbage dumped from the ship always brought more birds around than we saw on, or over land, excepting, of course, penguins.

Some live seals, not many, were lying on the beaches, more were farther out on ice cakes, but well inland, and scattered far and wide over the whole area were 20 or 30 (perhaps more) remains of dead seals,-- I would judge adolescent or half-grown -- may have been younger. The skin, and the bones within it were about all that was left; heads seemed to have been picked clean. The cause of death - I find it difficult to believe that they could have been stillborn young -- were much too large.

#53-63

A forenoon and afternoon dredge haul were combined and treated as one; were made in 30 fms. at the ship's anchorage, mud bottom. As on

such bottoms, worm tubes formed the bulk of the catch; a half dozen species of annelids were represented; one small sipunoulid worm; starfishes, ophiurans, and the largest holothurian yet taken; there were also a few coelenterate animals, stalked ones attached to small pieces of rock; and two long rope-like strands of a colonial ascidian. Another of these, $1\frac{1}{4}$ inch in diameter "ropes" was brought to me by a member of the ship's recreation party that was put ashore in the late afternoon. Also a dried pycnogonid (^DNecalopoda antarctica) was picked up on the beach; as well as a specimen of "krill" from near the mouth of a small melt-water stream flooded by the tide. Of the great windrows of algae on the beach a few samples were saved.

Here we lost the two traps that had been using regularly of late. So many and ^{such} large icebergs moved in on shore that we could not locate the trap floats. We still had one ^(trap) in reserve and the engineering department on the State Island quickly constructed us another out of wire that I had purchased in New Zealand for just such a contingency. But there was no opportunity to undertake a second trial here.

~~XXXXXX~~ Roughly, the biological potential hereabouts, from the marine biological point of view, rates good or better, bird and plant life are scanty. * ^{see page 673 for estimate}

There are fossils to be found. We got a fine specimen of ~~xxx~~ an ancient clam. Unless the paleontology here has been covered by others, there still may be an opportunity to accomplish something in this line at Welchness.

The~~a~~ apparent preoccupation of the site, by Argentina, however, does

argue against a U. S. biological station here at this time.

* I think Lendon^t report remarks that some marine biological work was carried on here in 1951-52. Shall check.

False Bay, Livingston Island.

Weather none too good, had to wait it out before we could be landed ashore even by helicopter; no place in this weather to beach shore boat; surf or swell breaking on the steep-to shingle and boulder covered beach (moraine debris?) rendered landing by boat impossible! - at least in this, and I would say in much other weather either. Getting in and out, off and on shore is a must for any station, and this should be possible most of the time. If not, the place is out as a station site.

#60-63 Did gather a fair collection of lichens and moss; Berlesed the latter aboard. Not time enough spent here to warrent setting fish traps.

Chinstraps were the only penguins seen ashore, a couple of rather widely separated, lonesome little groups of a dozen or so sitting forlornly among the rocks. No~~e~~ evidence that there had been a rookery on this beach. These penguins were probably of this year's crop "on their own", having been cast out at home; some of them were half through moulting their "chick" plumage.

Around the "corner" in South Bay, Commodore Lewis spotted a number of seals resting as usual, but this time in a fresh water pool. He said also that there was a colony of penguins about 400 feet up, probably Chinstraps, those are the only ones we saw elsewhere in these parts - and how the little "beggars" like to climb high! As his helicopter swooped down for a closer look, the penguins all ran toward the edge of the cliff, several dived over, to be killed on the rocks below. Seeing this, Commodore did not continue flying in this neighborhood.

#61-63 In the dredge: muddy, coarse sand, rocks and gravel from 17 fms.

along with hydroids; no end of worm tubes of various sorts; 2 ophiurans; mollusks; an amphipod; 2 isopods, 1 specimen of krill; 1 pycnogonid; some long strands of a ~~XXXX~~ colonial ascidian, and a few solitary stalked one.

t / Might enjoy dredging here, but a station in this place - NO!

Discovery Bay, Ash Point, Greenwich Island.

Quite a wide open place, windy as "all get-out" while we were about, full of shoals; weather thick to say the least.

Went out with survey party to Ash Point, hoping to be able to pick up our fish traps that had been set out the night before (February 25), but were recalled to the ship before this could be done.

Lt. Beam, who went ashore with the survey party, undertook to check on the penguins there. He saw no more than 5 or 6 Gentoos, and a single Chinstrap.

At this time of year, and in the weather we encountered here the Point is a bleak, sparsely, if at all populated place. In general, Chinstraps seem to predominate in the rookeries so far seen in the South Shetlands, I expected to find more here. Still, we did not get around as anticipated because of the weather. A number of the ship's personnel got stranded ashore, and an equal number of Chileans spent the night aboard the Staten Island when the seas and wind got too high the evening of the 25th.

#62-63

A dredge haul on the 26th, in 31 fms., mud bottom, at the ship's anchorage in the Bay turned up the first sizeable brachiopod of the cruise. Though no larger around than a nickel, it was ever so much larger than the few smaller than pea-size specimens we got on just one other occasion; otherwise, there were a lot of tube dwelling worms; 3-4 species of hydroids; bryozoans; a dozen extremely thin-shelled snails, mostly broken or crushed; and a half dozen of the rope-like colonial ascidion such as we had taken on several other occasions. This time we got the complete

animals, it seems; I did not know that they had roots holding them to the bottom. Well they have - good for our old steel drum! I always thought these "fellows" were free swimming, like sulps.

#63-63

In the fish traps when we got them back were just 2 notothoniid fish which I took to be different species, both were saved, a third little orange-colored fish ^{by} the "boys" said to have been in the trap, ~~it~~ got away in the shuffle; otherwise, there was just a starfish, an ophiuran, a small, crushed, red sea-urchin; and a few fragments of algae.

Except for the interesting sea life that seems to be had here, the area as a whole does not particularly appeal to me. Earlier in the summer there may be more animal life about, but if we are to biologically do Palmerland, I would rather be closer to it.

February 28
March 3, 4, 1963

Ardley Island area and Potters Cove, King George Island.

This February 28, at 0515 Capt. McDonald and I had a helicopter flight over Ardley Island and vicinity. We did not get over Potters Cove. There were lots of lakes in the hills and lowlands. Had a good view of the reef exposed at low tide that leads some to call the island Ardley Peninsula.

The bad weather we encountered on March 3 that ruled out all operations in Collins Harbor, continued over the 5th and interfered with all plans. The survey party that went ashore, had only 15 minutes there before being recalled.

#64-63

Weather, however, did not interfere with a dredge haul on the afternoon of the 28th. The very muddy bottom over which the drag was made, 47 fms. down, must be covered, literally, with a forest of worm tubes, the work, I should say, of some 8 to 10 different species of worms; an equal number of ascidian species were counted in this haul too, so intimately must some of them been associated with the tube worms that they had grown around the tubes, and used them for supports; there were also hydroids; 3-4 species of mollusks; 3 of sponges; 2 of starfish, and 2 of ophiurans; lastly a single isopod.

We did get out fish traps over but they were left on the bottom to be picked up on our return from Arthur Harbor where we were to go ~~th~~ for the next day or two. It was a generally bad day when we got back to them on March 3.

On our way to get the traps we dropped a survey~~y~~ party, including

Mr. Crowell and Capt. McDonald, on a beach between the Ardley and Fildes peninsulas.

Shortly after we got the traps up we were recalled to the ship, the idea being to give Lt. Beam a chance to look over an old wreck somewhere in the vicinity. He did not get to go nor did we get to take off the shore party. They were left to their fate, so to speak. Notwithstanding, they had themselves a party bonfire and ^{made a show of} shelter building in anticipation of a night ashore. Only Mr. Crowell out of the entire group of 8 or 10 had any survival gear with him - no radio - no boat.

At low tide the party probably could have made it over on the connecting reef to Ardley Island where there is a shelter hut, in case of necessity. Even so, they found a food ^{cache} chache right where they were stranded. It had been left behind by an earlier English survey party. However, no need arose to open it. For about supper time they were rescued.

The water inshore, though we could not see how it was from the ship at anchor, was relatively smooth and quiet compared with the sea out where the ship was "bouncing" up and down. All's well that ends well.

So impressed was Capt. McDonald who was ashore with the survey party, with the "excellence" of the area as a building, for shelter for boats, and the quiet water inshore, that I believe this Fildes-Ardley Peninsula site became his second choice site for locating the Palmer Peninsula biological station.

As this was no day for the birds and was so very late in the season, little can be said of the bird life of the vicinity. There were seals

about. The question was raised, could they be fur seals? There was no chance to investigate.

In the lifted traps, 6 fish were found ^{10 1/2} $1\frac{1}{2}$ to $13\frac{1}{2}$ inches on length, half a dozen starfish, and a number of red amphipods.

March 4 - Potters Cove:

This forenoon ashore, mosses, lichens, clumps of grass, and samples of the marine algae that had been thrown up on the beach were collected. Berlesed the mosses; later when I took moss and grass out of the bag in which they had been place, few insects (flies?) dropped in the pan over which I was working, and were quickly bottled.

There were several crab-eaters hauled out on the beach. Gentoo and Chinstraps were to be seen but in very limited numbers, a few of each at most, and fledglings at that. Also noted were Dominican gulls, skuas, Wilson's storm petrels, and two birds that Capt. McDonald said were Antarctic petrels or perhaps Giant Petrels. Lenton in his report listed Sheath-bills, but we saw none.

The dredge haul of this day, in Potters Cove, in 19 fms. mud bottom, produced a fine lot of mud dwelling, tube building worms, if anything larger and "handsomer" than those we got off Ardley Island but of the same species surely, the mollusks, likewise, were of the same species as yesterday, but the sponges, hydroids and echinoderms present in the haul of the day before we failed to find; did get an alcyonarian though.

After a morning flight over the area, Capt. McDonald remarked that Potters Cove seems to have about everything: the necessary piedmont

insuring safe landing for aircraft, width space on the snow-free land, too, for an airstrip, certainly for helicopter pads; a dock, mooring facilities, and a sizeable lake for water supply. The dredging holds forth hope for more rewarding collections than we made during our brief stay here, but I, for one, would like to leave the South Shetland, biology and geology, to the British who have already done so much in these fields in this general area, and in and about these islands.

Admiralty Bay.

Here, too, we struck bad weather, high winds and poor visibility, and were unable to effect a boat landing on either side of the Keller Peninsula. Tried the east side the afternoon of the 4th but found too much ice in the shallow water inshore. The survey party was put ashore by helicopter.

Because of continuing unfavorable winds the projected landing on the west side of the Peninsula on the 5th was also given up.

#75-63

However, a dredge haul was accomplished on the 4th. It was a rather meager one, containing a number of tube building worms, starfish; and a clam or two. The depth was 22 fms., the bottom mud.

Our fish traps put over this same evening, but not lifted until mid-morning of the 5th (having waited for the wind to die down) contained a very scanty catch, a couple of worms; some amphipods, and a starfish.

Coming up this area under very unfavorable circumstances, our trials were limited, nor could a thorough examination be made of the site on the east side of the Peninsula. However, there appeared to be land enough for an extensive installation if one had to be placed here.

The last we saw of King George Island was Penguin Island off to the east. Between poor visibility and the need for keeping a safe distance off-shore in bad weather we were not in a position to identify the bird colonies said to be on this little island and the adjacent nearby shore.

As we passed the spray over the ship almost obscured our sight of the island, sheets of it went right up against the wheelhouse windows, a good 70 feet above sea level.

Thus it was as we bowed out of the Palmer Peninsula area and the South Shetlands.

APPENDIX A

PALMERLAND SURVEY, 1962-63

Tow-net hauls made:

T-1-63	<i>Adelaide Island</i> Marguerite Bay	January	18
2	Bonaparte Inlet		24
3	Arthur Harbor		25
4	Port Lockroy		26
5	Petermann Island		28
6	Galindez Island		29
7	Galindez Island		31
8	Paradise Harbor	February	1
9	Bryde Island		2
10	Paradise Harbor		4
11	Danco Island		5
12	Melchior		6
13	Svend Foyn Harbor		9
14	Whalers Bay		12
15	Whalers Bay		13
16	Hope Bay		14
17	Welchness		20
18	Alcock Island		23
19	Discovery Bay		26
T-20-63	False Bay		25*

* Was numbered wrong, date is correct; will do as is.

APPENDIX B

ITINERARY, PALMERLAND SURVEY
(in and about Palmerland)

1963

Jan. 18-19	Marguerite Bay
Jan. 20	Rothera Point
Jan. 21	Underway for Anvers Island
Jan 22-25	Arthur Harbor
Jan 25-26	Port Lockroy
Jan. 27	Dorian Bay - Pleneau Island
Jan. 28	Petermann Island
Jan. 29	Galindez Island
Jan. 31	Cape Tuxen - Green Island
Feb. 1	Paradise Harbor
Feb. 2	Paradise Harbor
Feb. 3	Chilean Station
Feb. 4	Danco Island - Couverville Island
Feb. 5	Cape Sigot
Feb. 6	Gamma Island, Melchior Islands
Feb. 7	Gamma Island, Port Lockroy
Feb. 8	Dorian Bay
Feb. 9	Svend Foyn Harbor
Feb. 10	Lay to in Salvenson Cove - Brialmont Cove, Alcock Island
Feb. 11	Alcock Island
Feb. 12	Whalers Bay (or Bight) / <i>Deception</i> Island
Feb. 13	Left for Yankee Harbor
	Left for Hope Bay

Appendix B-2

Feb. 14	Hope Bay
Feb. 15	Left for Robertson Island
Feb. 16	Off Argentine Ice Shelf Base
Feb. 17	Off Snow Hill Island
Feb. 18	North end Seymour Island anchored between Vega, Cockburn and Seymour
Feb. 19	Seymour Island
Feb. 20	Welchness
Feb. 21	Suspiros Bay
Feb. 22	Underway for Alcock Island
Feb. 23	Spring Point, and Alcock Island
Feb. 24	Landed on Spring Point
Feb. 25	False Bay Livingston Island
Feb. 26	Discovery Bay, Ash Point
Feb. 27	Ardley Island
Feb. 28	Ardley Island
Mar. 1	Port Lockroy
Mar. 2	Paradise Harbor
Mar. 3	Ardley "Island" Cove, King George Island
Mar. 4	Potters Cove, King George Island
Mar. 5	Admiralty Bay, passed Lions Rump and Penguin Island
Mar. 6	Underway for Valporaiso!!!